"McGrath has again crafted new ideas to drive product development." — William A. Kozy, President, BO DIASNOSTICS

# DEST GENERATION PRODUCT

# DEVELOPMENT

How to Increase Productivity, Cut Costs, and Reduce Cycle Times

MICHAEL E. MCGAATH

# CONTENTS

Preface xvii

Chapter 1

SECTION ONE

INTRODUCTION

Project Success Generation

Project Scheduling 9

Time-to-Market Generation

Phase-Based Decision Making 12
Cross-Functional Teams 14
Standard Development Processes 15
Portfolio and Pipeline Management 16
Benefits of the TTM Generation 17
Adoption of TTM Generation Practices 18
Genesis of the R&D Productivity Generation 20
Chapter 2
The R&D Productivity Generation 23
Information Transforms Strategy, Processes, and Practices 24
The MRP Example 24
The Integrated Accounting Example 26
The Operation Iraqi Freedom Example 27
Characteristics of the R&D Productivity Generation 28
Product Strategy and Portfolio Management 29
Resource Management 30
Project Management 32

Previous Generations and the Promise of the New 3

- 10

Invention and Commercialization Generation

Project Team Organization

Benefit Model of the R&D Productivity Generation 33
Improved R&D Capacity Utilization 35
Increased Project Resource Efficiency 35
Developer Productivity 36
Gains from Partnering/Outsourcing 37
Increased R&D Administration Efficiency 38
Pipeline Effectiveness 38
Improved Product Strategy and Product Success 38
Resulting Benefits 39
Development Chain Management Systems 41
Common Concepts 43
Management Process Levels 43
Stages of Maturity 45
Commercial Robotics Incorporated 45
•
SECTION TWO
RESOURCE MANAGEMENT
Chapter 3
Improving R&D Productivity through Increased
Capacity Utilization 49
Measuring the Opportunity to Increase Capacity Utilization 5
The New Paradigm for R&D: Capacity Management 54
Understanding R&D Utilization 55
Measuring Trends and Goal Setting 57
Trend Reporting and Goal Setting 57
Basis for Computing Utilization: Assignments versus
Actual-Time Utilization 59
Levels of Reporting 60
Best Practices for Improving Utilization 61
Capacity-Based Portfolio and Pipeline Management 62
Increased Awareness of Capacity Utilization 63
Resource-Based Phase-Review Decisions 63
Resource-Based Project Planning 64
Resource Group Assignment Balancing 65
Longer-Term Capacity Planning and Management 65
Skill Planning 66
Resource Charge-Out 66
R&D Outsourcing 67

Chapter	4
---------	---

### Stages of Maturity in Resource Management 69

Three Levels of Resource Management 70

Level 1: Project Resource Scheduling 71

Level 2: Resource Requirements Planning and Management 72

Level 3: Workload Management 73

Flow between Levels 74

Resource Management Stages of Maturity 74

Stage 0: Informal Resource Management 76

Stage 1: Short-Term Utilization Management 77

Stage 2: Medium-Term Capacity Planning and Management 78

Stage 3: Resource Requirements Planning (RRP) 79

Stage 4: Integrated Resource Management 79

How the Levels and Stages Work Together 80

Roadmap for Improving Resource Management 81

Summary .. 82

### Chapter 5

### Stage 1-Short-Term Utilization Management 83

Resource Assignment 84

Project Resource Assignment 85

Resource Group Assignment Management 87

Utilization Reporting 91

Resource Assignment Costs 92

Requirements 93

Benefits 96

Summary 97

### Chapter 6

## Stage 2—Medium-Term Resource Capacity Planning and Management 99

Resource Capacity Planning 100

Short-Term Resource Capacity Planning 102

Medium-Term Resource Capacity Planning 103

Integration with Annual Financial Planning 104

Pipeline Capacity Management 105

Long-Term Resource Capacity Planning 106

Project Resource Needs 106

Project Planning with Resource Needs 107

Resource Needs and Skill Categories 109

Resource Group Management with Resource Needs 110

Resource Transaction Process 112 Resource Needs 113 Resource Requests 113 Resource Assignments 115 Requirements 115 Benefits 117 Summary 118 Chapter 7 Stage 3—Project Resource Requirements Planning and Management 119 Project Resource Requirements Planning (RRP) 122 Using Resource Requirement Guidelines 123 Making Preliminary Resource Estimates 123 Time-Phasing Steps to Balance Resources 126 Balancing Resource Requirements among Skills Transforming Resource Requirements into Resource Needs 129 Resource Requirements Management Workload Reconciliation 134 Requirements Benefits 137 Summary 138 Chapter 8 Stage 4—Fully Integrated Resource Management 139 Level 1 Points of Integration 141 Integration with Pipeline/Portfolio Management Reconciliation with Functional Budgets Integration with Annual Financial Planning Integration with Project Budgets 143 Product Strategy Integration Integration with HR Systems Skill Categories 144 Integration with Multiple Resource Groups Integration with External Resources Level 2 Points of Integration 146 Integration with Project Planning 146 Closed-Loop Time Collection

Integration with Knowledge Management Systems

148

Level 3 Points of Integration Requirements 149 Benefits Summary 149 SECTION THREE PROJECT MANAGEMENT Chapter 9 Stages of Project Management 153 Stage 3-Enterprise Project Management Enterprise Project Planning and Control 155 Networked Project Teams Enhanced Phase-Review Process 157 Stage 4—Advanced Project Management Practices Integrated Financial Planning and Project Budgeting 158 Distributed Program Management Collaborative Development Management 159 Context-Based Knowledge Management 159 Summary 160 Chapter 10 **Enterprise Project Planning and Control Process** Enterprise Project Planning Architecture Enterprise System versus Project Planning Tool 164 Hierarchical Structure Top Down versus Bottom Up Distinction between Project Planning and Work Management 167 Integration with Resource Management The Enterprise Project Planning and Control Process 169 Collaborative Project Planning 170 Collaborative Project Control 172 Integration with Project Planning Standards Integration of Project Plans Project Plan as the Basis for the Networked Team 175

Enterprise Project Planning and Control at CRI

Benefits

Summary

178

179

### Chapter 11

### Networked Project Teams 181

Cross-Functional Core Team Management 182

Traditional Cross-Functional Core Team Model 183

Distributed Email Communications in Core Teams 185

The Networked Project Team 188

Project Communication in Networked Project Teams 189

Project Coordination in Networked Teams 191

Project Schedule-Items 192

Project Calendar-Items 193

Project Deliverables 194

Project Action-Items 194

Issue-Resolution Items 195

Project Bulletin Boards 196

Content Management in Networked Project Teams 197

Project Document Management 197

Collaborative Document Preparation 198

Networks of Networked Teams 199

Requirements 200

Benefits 201

Summary 202

### Chapter 12

### Enhanced Phase-Review Management 203

Phase Reviews 203

Product Approval Committee (PAC) 204

Phase-Review Process 204

Phase-Review Process Limitations 206

Enhanced Phase-Review Management Improvements 207

Phase-Review Decisions with Resource Availability Information 207

Combined Phase Reviews 209

Project Tolerances 209

PAC Information System 211

Focus of Phase Review 212

Requirements 213

Benefits 213

Summary 214

### Chapter 13

# Integrated Financial Planning and Project Budgeting for New Products 215

Integration of Financial Information 217

Common Planning Models 220

Project Budgets Automatically Derived from Resource Assignments 2

Financial Data Directly Based on Source Data 221

Incorporation of Financial Information in Project Documents 222

Project Budget Updates with Actual Costs 222

Consolidation of Financial Information across Projects 223

Integrated Financial Planning at CRI 224

Revenue Projection 224

Product Cost Estimate 227

New Product Financial Plan 229

Integrated Project Budgeting at CRI 230

Development Resource Cost 230

Expense Budget 231

Project Budget 231

Capital Budget 233

Project Financial Analysis 233

Financial Management of New Product Project 236

Actual-Cost Management 236

Earned-Value Analysis 238

Revision Control 239

Requirements 240

Benefits 241

Summary 241

### Chapter 14

### Distributed Program Management 243

Product Development Programs 245

Coordinating Multiple Versions of a Product 246

Managing a Complex Project as Subprojects 247

Integrating Common Technology Development Projects with

Multiple Product Development Projects 247

Coordinating Related Product and Process Development 248

Distributed Program Planning and Control 249

Distributed Program Team Coordination 250

Integrated Program Financial Management 253

Requirements 256 Benefits 257 Summary 257

### Chapter 15

### Collaborative Development Management 259

Categories of Collaborative Development 260

Customers 261

Development Partners 264

Contractors 265

Suppliers 266

Channel Partners 267

Collaboration Systems Services 267

Collaboration Based on Email 2

Using a Shared File Server 269

Collaborating with a Web-Based Workspace 269

Integrating Partnering Capabilities into the DCM System 270

Integrating DCM systems 272

Outsourcing of R&D 274

Requirements 274

Benefits 275

Summary 276

### Chapter 16

### Context-Based Knowledge Management 277

Types of Knowledge and Experience in R&D 278

Standards, Guidelines, and Policies 279

Templates 281

Financial Models 282

Experience Gained from Previous Projects 282

Reference Documents 283

Project Plans and Step Planning 284

Educational Materials 284

External Information 285

Delivering Product Development Knowledge through DCM Systems 286

Step Libraries 286

Linking Knowledge to Tasks and Roles 287

Collecting Product Development Knowledge 289

Requirements 290

Benefits 290

Summary 291

CONTENTS

### SECTION FOUR

### PORTFOLIO MANAGEMENT AND PRODUCT STRATEGY

Chapter	17

### Stages of Portfolio Management and Product Strategy 295

Process Levels of Portfolio Management and Product Strategy 29%

Product Strategy Process Level 298

Portfolio and Financial Management Process Level 299

Pipeline Management Process Level 300

Integration with Other Processes 301

Stages of Portfolio Management and Product Strategy 302

Stage 0-No Portfolio or Pipeline Management 303

Stage 1-Periodic Portfolio and Pipeline Management 303

Stage 2—Dynamic Portfolio and Pipeline Management 305

Stage 3—Comprehensive Financial Management of R&D 306

Stage 4—Integrated Product Strategy 307

Summary 308

### Chapter 18

### Dynamic Portfolio and Pipeline Management 309

Dynamic Portfolio Management 311

Real-Time Integration with Project Data 311

On-Demand Portfolio Analysis 313

Integrated Portfolio Management Process 314

Dynamic Pipeline Management 315

Real-Time Integration with Project Resource Management 3

Pipeline Simulation and Optimization 318

Integrated Pipeline Management Process 320

Requirements 321

Benefits 321

Summary 322

### Chapter 19

### Comprehensive Financial Management of R&D 323

The CFO's New Role in R&D 324

Consolidation of New Product Financial Information 320

Consolidated Revenue Projection 327

Consolidated Capital Plan 330

Consolidated New Product Profitability and Expense 331

Consolidated Project Budgets 331

Reconciliation of Functional and Project Budgets 331

Tracking Functional Budget Allocation to Projects 332

Basing Functional Budgets on Expected Resource Requirements 334

Requirements 335

Benefits 335

Summary 336

### Chapter 20

### Integrated Product Strategy Process 337

A System and a Process for Product Strategy 338

Product Line Plan 340

Planned Products 341

Standard Planned Product Profiles 343

Simulating the Feasibility of a Product Line Plan 344

Idea Management 344

Technology Planning 347

Requirements 348

Benefits 349

Summary 349

### SECTION FIVE

### CONCLUSION

### Chapter 21

### Getting Started 353

DCM Systems 353

Processes and Practices 354

Implementation Planning 355

Conclusion 357

Endnotes 359

Glossary 361

Index 365